SCIENCE.

FRIDAY, APRIL 23, 1886.

COMMENT AND CRITICISM.

AT A TIME when the interest in the industrial organization of society is so great as it is at the present moment, it seems proper that *Science* should do its part in giving an opportunity for the free discussion of the views of any who have made especial study of social questions. It is claimed by the leaders of the working-classes, so called, that the real advances in society organization are not led by the *doctrinaires* of the schools, but by hard-fisted workingmen, who know more of their physical and intellectual wants than they do of logic. These self-asserting leaders compliment the professors upon their well-rounded sentences, giving a history of what has been accomplished, and sketching what may be the outcome of the future, but they look upon the schoolmen as little more than scribes. Despite this lowly position to which the professors of political science are assigned, there can be no doubt of the necessity of giving the reading-classes as good an opportunity as possible for appreciating the present condition of social science and for understanding the questions which are now demanding solution. Before venturing upon the wide field of sociology, it is well first to present a clear statement of the tenets of political economy as they are advanced by the writers of the times. There exists in this country, as well as abroad, a body of students, principally young men, who, after pointing out the continued progress in the tenets of political science as time changes society, insist that the at present, or recently, held dogmas are not dogmas at all, but must yield to other rules of expediency involved by the changing condition of industrial activity.

Of course, it is well understood that one main difference between this new school and the old is in asserting the desirability of greater interference in industry on the part of the state. Somebody might say that this idea has come from Germany, where the state initiative is so paramount in all enterprise; but the adherents of the new school repudiate the assertion that their movement is a German movement, and claim that the discontent with the application of antiquated doctrines made itself felt in the valley of the Po, the heart of New England, and on the banks of the Thames. In a word, they say that the times are ripe for a decided renovation of the tenets of political economy; and it is with a view of giving this school an opportunity of propounding the fundamental principles which they think should rule at the present time in that science, that a series of articles has been arranged to appear in *Science*. This series begins in the present number with one upon 'The change in the tenets of political economy with time,' by Mr. Edwin R. A. Seligman of Columbia college. Others will follow by Prof. E. J. James, on 'The state as a factor in economics;' by Prof. R. T. Ely, on 'Ethics and economics;' by Prof. H. C. Adams, on 'The idea of property as an economic category,' showing how this varies with our ideas of what is best suited to the times; by Prof. J. B. Clark, upon 'The limits of competition, natural and artificial;' by Prof. R. M. Smith, on 'The methods of investigation in economics;' and by Prof. Simon Patten, on 'The effect of the consumption of wealth on the economic condition of society.' The article in the present number, by Mr. Seligman, is intended to present a review of the history of the industrial organization up to the present time, and to indicate in what direction the further development may take place. The other articles of the series will probably be accompanied by criticism from the pens of those belonging to the so-called orthodox school.

SEVERAL VIOLENT TORNADOES in Minnesota and Iowa, on the afternoon of April 14, proved unusually destructive to life and property on account of finding towns in their way. The description of them in the associated press reports is exceedingly poor, by reason of the reporters' unsuccessful efforts to do rhetorical justice to the sad occasion; but it may be gathered that there was a number of separate tornadoes occurring at about the same time, and following the customary south-west to north-east path, though there is confusion in the statements with respect

to this last point, and that in the neighboring districts there was a violent thunder-storm with heavy rain and hail. On consulting the daily weather-maps for April 14 and 15, a well-marked 'area of low pressure' is found moving northeastward from Wyoming, over Dakota, into the Winnipeg district; a very abnormal turn of the isotherms shows how the winds on the southeastern side of this 'area' carried warm air far up the Mississippi valley, and brought about the strong contrasts of temperature and moisture that generate violent local storms. These tornadoes were therefore *normal*, or like the average of their class, in every respect — except, perhaps, in occurring farther north than is usual at this time of year.

In review of this, there seems to be ground for the desire so generally expressed that the signal service should give some warning of the probable occurrence of tornadoes, at least in such a way that the inhabitants of towns in the exposed districts may be on the lookout for the approach of the dreaded funnel-cloud. The reports state that in the open country there was little loss of life, as the storms came by day, and persons generally saw them in time to take refuge in the tornado-cellars with which nearly every farm in that region is provided. But in the towns, where persons remain more indoors, and where clouds near the horizon are not easily seen, tornadoes too commonly arrive unperceived till the roar of their winds tells that there is no time for escape; and here some early intimation of the impending danger should be given. The warnings based on the conditions shown in the morning weather-map might be announced as experimental for a season, so that a public trial of their value could be made. Towns at least could be reached by telegraph and telephone in all parts of the Mississippi valley by noon on the days of danger; and the saving of lives in some places would compensate for a good deal of needless anxiety caused by warning towns that escape destruction. There seems to be no way whatever of saving property that lies in the path of the storm.

One has only to glance at a bibliography of astronomy during the present century to become impressed with the fact of two very marked impulses to investigation in that science, given by the discovery, first, of the planet Neptune in 1846, and, second, of the satellites of Mars in 1877. The latter has given rise no less to a series of popular and educational books and treatises on astronomy, in many languages, of which, it would seem, the end is not yet. These have had all degrees of worth, as their production has been participated in by authors of all degrees of information and capacity, from those who have the scantiest of reason for writing any thing whatever, to astronomers of the maturest experience, both as teachers and as investigators. The author of the work to which we call attention in a subsequent column is not unknown in our country. His early years as an astronomer were spent at Parsonstown, Ireland, in charge of the mammoth reflecting telescope of the Earl of Rosse, to which post he was appointed in 1865, at the age of twenty-five years. Dr. Ball became astronomer royal twelve years ago; and he has attained no little fame as a lecturer, having appeared before the leading learned institutions of Great Britain. Also in 1884 he lectured before our own Lowell institute, Boston, and in January last the honor of knighthood was conferred upon him.

In view of these facts, the developments in regard to his unacknowledged appropriation of the work of others assume the greater importance. In the *Nation* a fortnight or two ago, attention was directed to certain passages in 'The story of the heavens,' which Dr. Ball had borrowed bodily from Professor Newcomb's 'Popular astronomy,' with evidently no intention of ever making a proper return; while, in our present issue, it becomes apparent that he has paid a like compliment to Professor Young's admirable treatise on 'The sun.' Every one who reads it must thank Dr. Ball for a fascinating book, a very accurate one too, and he has made excellent use of his pilferings; but it seems as if he might have made a freer use of inverted commas, or confined himself, if we may borrow from Mr. Lowell, to 'pillaging the dictionary.' And this leads us further to an uncompromising denunciation of a reckless, extempore sort of book-making, too common nowadays, and which cannot be too strongly condemned. The publishers, in their struggle to meet the insatiate cry for something new, something that will sell because it is new, are as much to be blamed as authors; and the people even more, for creating a demand for these loosely woven fabrics. It is, however, a demand

which, soon or late, must cease; for, while many buy, few read, and they the close readers who make quick work of the loose author. If it is a necessary stage of our evolution, it may be hoped that the relay is not far removed.

GOVERNMENT SURVEYS.

THE proper co-ordination and management of the different government surveys, in order to secure in the most economical manner the results for which they were created, has been and yet is the subject of considerable discussion, and of diverse views among those interested. The consolidation of the geological surveys has prevented much of the clashing that formerly inevitably resulted, and at different times the national academy has been called upon to propose plans for the relations that should exist between the different bureaus. The chief ones proposed, as the readers of *Science* are aware, are, 1°, that the secretary of the Smithsonian institution should be placed in control: 2°, that there should be a cabinet officer, a secretary of science and industry, who should be charged with all the different bureaus. Prof. W. P. Trowbridge, in the issue of the New York *Star* for April 13, urges the establishment of a permanent commission, which should be competent to understand the different works, and have sufficient time to examine them yearly in detail. As he further says, there can be no question but that, in the appropriation of money by congress for any purpose whatsoever, the objects and aims to be accomplished by such appropriation should be definitely and fully known; and funds for any public works of a continuous character should never be dependent upon personal urging by the heads of bureaus, and all this should be within the province of a central co-ordinating authority.

He believes that a properly organized permanent non-political commission, such as that known as the Regents of the Smithsonian institution or the Lighthouse board, and in which should be represented the executive heads of the bureaus, the legislative branch of the government, and the scientific men of the country, would be an efficient safeguard against misdirected expenditures, faulty schemes or projects, and the duplication of work by two or more bureaus. It is not at all certain that a cabinet officer, with his political tenure of office, would be sufficient to co-ordinate the different surveys, except in so far as he would serve as a fiscal administrator, and as a medium between the scientific bureaus and congress or the executive. Political considerations would make it improbable that such a head could always be found who should possess the varied scientific and other qualifications that would be required to determine the scope, the field of work and investigation, and the methods to be pursued for each branch of scientific work.

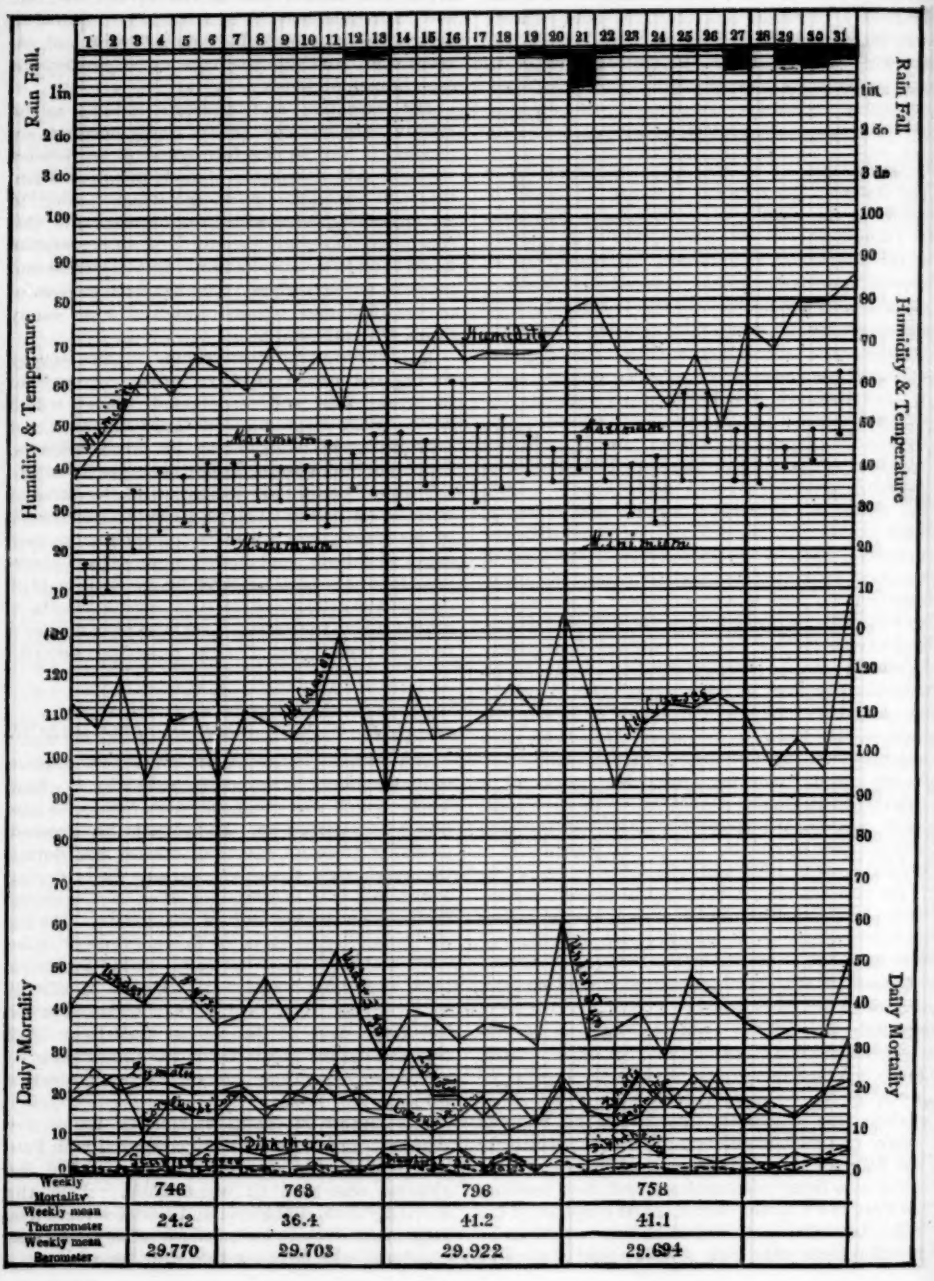
The executive and scientific details, as he rightly says, of any one of these bureaus, are enough to tax to the full extent of his powers the most skilled expert in those branches of scientific and practical knowledge which belong to the objects represented by the bureau. For this reason he deprecates any attempt to consolidate the different bureaus, and especially the coast and geodetic survey, whose work has been so fruitful of practical and valuable results for so many years, with any other.

The unfortunate shortcomings in this survey during the past year have given currency to numerous false and exaggerated rumors, which have tended to produce an injurious result, not only upon the public mind, but upon congress. Professor Trowbridge urges the injustice of including in general condemnation all the different bureaus on account of the errors of individuals in one branch, and yet more justly cites the long years of faithful and highly valuable public services that have been rendered by the great body of officers and attachés of the coast survey, who have grown up in the service, and who have not for a moment been included in any recent accusations.

HEALTH OF NEW YORK DURING MARCH.

WE continue in the present number the graphic representation of the daily mortality in New York, which was commenced in *Science* in the number for March 19. In February the greatest mortality from all causes of disease was during the tenth day, when 118 persons died: during March this was exceeded on four days, running up to 137 on the last day of the month. During the twenty-eight days of February there were 2,767 deaths; during the same period in March there were 3,054 deaths, — an increase of 277: if to this are added the deaths which occurred in the last three days of March, we shall have 3,392 representing the mortality of the past month, — an average of nearly 110 each day, or about 5 persons every hour.

The number of deaths of children under five years of age has increased as compared with February; there has also been an increase in the zymotic class and in consumption; while the mortality from diphtheria and scarlet-fever is less. Diarrhoeal diseases have carried off 32 persons, as compared with 33 in the preceding month.



Weekly Mortality	746	763	796	758
Weekly mean Thermometer	24.2	36.4	41.2	41.1
Weekly mean Barometer	29.770	29.703	29.922	29.694

The coincidence between the lines of scarlet-fever and diarrhoeal diseases, to which attention was directed in the number of *Science* already referred to, is equally marked this month: in fact, they run so nearly parallel, that it is often impossible to distinguish them. The summer mortality has not yet commenced to show itself, but many weeks will not pass before we shall see its line gradually rising higher and higher, until it reaches its height in midsummer.

The meteorology for the month presents some interesting features. The rainfall was considerably less than in February; in the latter month 4.89 inches having fallen, while during March there were 2.83 inches, the actual time in which this amount fell being 2 days 20 hours 40 minutes. During the sixteen years 1869–84 this amount was exceeded in every year but four, so that March, 1886, was, in comparison with other years, a dry month.

Another point of interest in the meteorology of March of this year is the absence of snow. But an inch fell during the entire month, and that on the twenty-seventh day. During the period of sixteen years already referred to, so small an amount fell in only five years, while in some of the years the quantity was very great; notably in 1870, when 9.63 inches fell; in 1875, 15.25 inches; and in 1883, 10 inches.

It will be remembered that in February the highest reading of the thermometer was 52° F., and the lowest — 4° F. In March the maximum temperature was 62° F., and the minimum 8° F., the monthly mean for March being some 31° higher than that for the preceding month.

The population of the city of New York on March 1 was estimated to be 1,424,903, and increases presumably 799 each week.

POPULAR ASTRONOMY.

IN the 'Story of the heavens,' Dr. Ball presents to the popular reader an extremely entertaining account of the discoveries, researches, facts, and theories, of a science which, in a general way, is of interest to a larger class of people than any other department of learning. The book is specially directed to the non-astronomical; the style is strong and vigorous; and many points are elucidated in so striking a manner that even the professional astronomer, if modest enough, can get many a good suggestion from it.

Ambiguities and misstatements of fact are quite entirely absent. Dr. Ball appears to be rather less certain than the facts warrant, that the sun-spots are depressions; and he would find few astronomers, in this country at least, who would agree with him that the late Professor Watson probably discovered an intra-mercurial planet or planets during the eclipse of 1878. In parts of his work the historical method is pushed to the extreme. The complex theories of our astronomy will doubtless appear in the least difficult form if viewed in the light of the logical order of their dawning upon the philosophic mind; but the attempt to insist on this method of treatment appears, in some instances, to have led Dr. Ball into an unnecessary multiplication of wordy paragraphs. While thoroughly interesting and delightfully told, his 'Story' is, for all that, a pretty long one; and we cannot but think that it would have been better received, not to say more carefully read, if, by some such omissions as these, Dr. Ball had sooner brought it to a close.

Works on popular science, often a mere retailing at second or third hand of the labors of the professional investigator, are not infrequently filled with such misrepresentations of these labors as to be utterly misleading to the learner, not to say wrath-inspiring to those scientists whose work forms the unwilling subject of the story. Dr. Ball commits no offence of this sort: he is one of these investigators himself, but his own researches are not brought into undue prominence. We should, however, take exception to his account of the transit of Venus of 1882 as seen at Dunsink, where no observations of marked importance could be made, — an account which, therefore, cannot give a sufficient and characteristic view of the magnitude of the very extended operations conducted elsewhere on that occasion. We find no allusion to the abundant series of photographs of that transit, obtained by the American parties, which, it is safe to say, constitute the most important and successful record of a transit of Venus ever secured.

In some other parts, also, the 'Story of the heavens' is not well balanced. There is, perchance, the best of reason for being dissatisfied, or rather unsatisfied, with the present state of solar research. In the chapter on the sun, we find an exceptionally full description of the solar spots; but the question as to what they are is dismissed in a word. The progressive theories of the constitution of these objects form a most important contribution to the history of astronomy; and many a page in the book might better have been devoted to an outlined statement of these theories, and of what the spots, to say the least, seem likely to be. We should make much the same criticism of the author's treatment of that

The story of the heavens. By ROBERT STAWELL BALL. London, *Cassell*, 1885. 8°.

important but mysterious phenomenon, the zodiacal light.

No inconsiderable number of persons sufficiently interested in astronomy to read a book of this sort desire to become themselves observers; not with reference to making contributions of value to the science, but simply for their own advancement and edification. Early in his work, Dr. Ball has an interesting word for such readers, suggesting work well worth doing, and for which only an opera-glass is required. Why not have elaborated this idea more fully farther on, and with reference to various celestial objects within ready reach of slender telescopic means?

We are glad to see the care with which an abounding index has been prepared: it contains something like twelve hundred entries, and covers no less than eleven pages of the book.

In the last chapter, when treating of the tides, Dr. Ball is at his best. And by tides are meant, not alone the rise and fall of the sea as we note it to-day, but the term is used in its broadest sense, and the vast problems of tidal evolution dealt with in a wholly captivating style. This new departure in mathematical astronomy, as Dr. Ball justly terms it, is fully elucidated, and the non-mathematical reader owes him many an obligation for this clear and elegant exposition of the profound mathematical researches of Professor Darwin.

The illustrations are, as a whole, the best we have seen in any book on popular astronomy. A good many of them are new, a good many are borrowed with full credit, and yet others are borrowed without any credit. To the last class belong a number appropriated from Newcomb's 'Popular astronomy,' notably those on pp. 78 and 214 of the latter work, which are reproduced on pp. 104 and 228 of Ball. Presumably the charge of plagiarizing the text accompanying these illustrations would be sustained with difficulty; but it would be interesting to know how much time elapsed between Dr. Ball's reading of this text, and the writing of his own paragraphs on the effect of gravity on a projectile, and on the toothed-wheel method of determining the velocity of light. In our way of looking at it, subtracting the smoke from the lamp, and five teeth from the wheel, and supplementing the man's head with one shoulder and a mustache, fail to establish one's right to an illustration otherwise successfully 'conveyed.'

But Dr. Ball has not confined his attentions to a single work. In filling out his chapter on the sun, he found that something already written by somebody else would save him the drudgery of a page here and there, and he appears to have had no compunction in calling it his own. A few paragraphs from Young's 'The sun' and from Ball's 'The story of the heavens' are subjoined: —

YOUNG (p. 118).

"The average life of a sun-spot may be taken as two or three months; the longest yet on record is that of a spot observed in 1840 and 1841, which lasted eighteen months. . . . While some spots are thus long-lived, others, however, endure only for a day or two, and sometimes only for a few hours.

"The spots usually appear not singly, but in groups — . . . Very often a large spot is followed upon the eastern side by a train of smaller ones; many of which, in such a case, are apt to be very imperfect in structure, . . . When a large spot divides into two or more, as often happens, the parts usually seem to repel each other, and fly asunder . . . velocities of one thousand miles, and even more, are by no means exceptional.

"At times, though very rarely, a different phenomenon of the most surprising and startling character appears in connection with these objects: patches of intense brightness suddenly break out, remaining visible for a few minutes, moving, while they last, with velocities as great as one hundred miles *a second*.

"One of these events has become classical. It occurred on the forenoon (Greenwich time) of Sept. 1, 1859, and was independently witnessed by two well-known and reliable observers, Mr. Carrington and Mr. Hodgson, . . . Mr. Carrington at the time was making his usual daily observation upon the position, configuration, and size of the spots by means of an image of the solar disk upon a screen, . . . Mr. Hodgson, at a distance of many miles, was at the same time sketching details of sun-spot structure . . . They simultaneously saw two luminous objects, shaped something like two new moons, each about eight thousand miles in length and two thousand wide, at a distance of some twelve thousand miles from each other. These burst suddenly into sight at the edge of a great sun-spot, with a

BALL (p. 36).

"The average duration of a sun-spot is about two or three months, and the longest life of a spot that has been recorded is one which in 1840 and 1841 lasted for eighteen months. There are, however, some spots which last only for a day or two, and some only for a few hours.

"It should also be observed that the sun-spots usually appear in groups, and very often a large spot is attended or followed by a number of smaller ones, more or less imperfect. It often happens that a large spot divides into two or more smaller spots, and these parts have been sometimes seen to fly apart, with a velocity in some cases not less than a thousand miles an hour. On rare occasions a phenomenon of the most surprising character has been witnessed in connection with the sun-spots, where patches of intense brightness suddenly break out, remain visible for a few minutes, and travel with a velocity of over a hundred miles a second. One of these events has become celebrated for the extraordinary character of the phenomena, as well as for the fortunate circumstance that it has been authenticated by the independent testimony of the skilled witnesses. On the forenoon of the 1st September, 1859, two well-known observers of the sun, Mr. Carrington and Mr. Hodgson, were both engaged in observation. Mr. Carrington was employed at his self-imposed daily task of observing the positions, the configuration, and the size of the spots by means of an image of the sun upon a screen. Mr. Hodgson, many miles away, was at the same moment sketching some details of sun-spot structure. They saw simultaneously two luminous objects, shaped something like two new moons, each about eight thousand miles long and two thousand miles wide, at a distance of about twelve thousand miles

dazzling brightness at least five or six times that of the neighboring portions of the photosphere, and moved eastward over the spot in parallel lines, growing smaller and fainter, until in about five minutes they disappeared, after traversing a course of nearly thirty-six thousand miles."

YOUNG (p. 267).

". . . the temperature at the focus can not rise above that of the source of heat, the effect of the lens being simply to move the object at the focus virtually toward the sun; so that, if we neglect the loss of heat by transmission through the glass, the temperature at the focus should be the same as that of a point placed at such a distance from the sun that the solar disk would seem just as large as the lens itself viewed from its own focus.

"The most powerful lens yet constructed thus virtually transports an object at its focus to within about two hundred and fifty thousand miles of the sun's surface, and in this focus the most refractory substances — platinum, fire-clay, the diamond itself — are either instantly melted or dissipated in vapor. There can be no doubt that, if the sun were to come as near us as the moon, the solid earth would melt like wax."

BALL (p. 495).

". . . the temperature at the focus cannot be greater, cannot be even equal, to the temperature at the source of heat itself. The effect of a burning-glass is merely equivalent to making a closer approach towards the sun. The rule is indeed a simple one. The temperature at the focus of the burning-glass is the same as that of a point placed at such a distance from the sun that the solar disk would seem just as large as the lens itself viewed from its own focus. The greatest burning-glass which has ever been constructed virtually transports an object at its focus to within 250,000 miles of the sun's surface: in other words, to a distance of about 1-400th part of its present amount. In this focus it was found that the most refractory substances, agate, cornelian, platinum, fire-clay, the diamond itself, were melted or even dissipated into vapour. There can be no doubt that if the sun were to come as near to us as the moon, the solid earth itself would melt like wax."

By what name Dr. Ball would call this wholesale pillaging of others' books, we do not know; but it seems to us to fall little short of tallying with the work of the plagiary. Substituting 'greatest burning-glass' for 'most powerful lens,' and adding agate and cornelian to a list of refractory substances already fully long enough for the purpose of illustration, do not show any mark of great originality, while the continued effort to conceal the theft is petty in the extreme. We have not had the time to trace Dr. Ball's possible liberties with other authors than these, but our researches thus far have left us in the mood for suggesting that the titlepage of subsequent editions of his work might with some little show of justice contain the insertion 'compiled by ——.' Any one who cares to investigate further may perhaps like to judge for himself how much of pp. 495–505 in Dr. Ball's very interesting chapter on the 'Astronomical significance of heat' (the greater part) was directly suggested by a like number of pages at the end of Professor Young's chapter on the 'Sun's light and heat.' While in another part of his book Dr. Ball alludes to Professor Young as 'the well-known authority,' etc., in the chapter in question we find no mention of the name. Professor Young would doubtless be very glad to be of assistance to Dr. Ball, but we think he is human enough to care for the graceful acknowledgment of the service.

GEOGRAPHICAL NOTES.

Dutch statistics of population. — Kuyper has recently given an interesting discussion of the population-statistics of the Netherlands. The population for the whole kingdom is found to be 121.6 per square kilometre, and 75.0 for the lowlands, and varies from 265.9 to 44.6 for the same area in different districts. The females out-number the males by from one to two per cent. Of the population, 32 per cent are married; 61.55 per cent are Protestants, 36.02 are Catholics, and 2.04 per cent are Israelites, in religion; and, in occupation, 20 per cent are agriculturalists, 26 per cent laborers, 12 per cent merchants, 18 per cent manufacturers or mechanics, 2.5 per cent soldiers, 2.3 per cent engaged in religious, scientific, or sanitary professions. The increase of population from 1860 to 1880 varied from 12 per cent, in Limburg, to 30 per cent, in Holland proper. Of thirty-eight centres of over 10,000 inhabitants, one (Delftshaven) has doubled, seventeen have increased more than 25 per cent, and twelve others have increased from 10 to 25 per cent, during the same period. The work is supplemented by an instructive chart showing the increase of population for the period by single parishes, — a course only practicable in so small a country as Holland.

Search for mammoths in the Lena Delta. — Dr. Bunge has sent to St. Petersburg a chart of the Lena Delta, corrected during the numerous long journeys undertaken by him in search of frozen mammoths. His travels were more lucky geographically than biologically, for he found but one skeleton, and that deprived of head and one fore-leg. It had been exposed for ten years to the attacks of dogs, foxes, and natives, but had originally been covered with a thick coat of hair, which might have defended it against even the present climate of the delta, provided it could have obtained food to its liking.

Medals of Paris geographical society. — The great gold medal of the Paris geographical so-

ciety, for 1886, has been awarded to Messrs. Capello and Ivens, for their African journeys. A smaller gold medal has been given to the 'Pundit A. K.,' one of the anonymous explorers for England of upper Tibet; and medals of silver and bronze to Messrs. Bloyet and H. Mager, for African topography and the 'Colonial atlas.' The *prix Logerot* is received by M. Marche, for his explorations of the Philippines.

A new oil. — The oil of a species of bamboo of African origin is reported by the Catholic missionaries of Alima in Africa to be an excellent lubricator, and, when refined, to form a fair substitute for olive-oil in the cuisine. The new industry thus created is actually in process of development in the French Kongo region.

Ethnographic map of Asia. — Von Haardt of Vienna has sent out a prospectus of a new ethnographic map of Asia, in six sheets, scale 1: 8,000,000, total size 175 x 140 cm. The scheme includes one hundred and thirty-six ethnic divisions, to be indicated by appropriate tints and hachuring. The subscription price is placed at thirty francs. The classification adopted has its defects; but the map, which will be accompanied by a small explanatory pamphlet, to all interested in the distribution of mankind, will have great value. If successful, it will be followed by maps of other continents, on the same plan. Subscriptions are to be sent to Eduard Hölzel, Vienna, Weyringergasse 19.

ASTRONOMICAL NOTES.

The two comets. — Fabry's comet continues to increase in brightness, and on a clear morning is bright enough to be made out with the naked eye, though it does not reach a sufficient altitude before sunrise to be very conspicuous in the presence of bright moonlight. Barnard described it on the 8th inst. as a hazy object with a faint tail, which, in the telescope, could be traced for five or six degrees. On April 24 the comet will be in the constellation Triangulum, in right ascension $1^h\ 32^m$, north declination 30° 3′, and will appear above the horizon about half-past three in the morning. Its brightness is then 297 times as great as at the time of discovery. The comet is increasing its right ascension, and is moving rapidly south: at the end of April, according to Dr. Oppenheim's ephemeris, it will approach us within a fifth part of the distance of the sun, and its theoretical brightness will be nearly 500 times that at discovery. Barnard's comet is also increasing in brightness, but somewhat more slowly than Fabry's. It makes its nearest approach to the sun in the first week of May, and its nearest to the earth in the latter part of that month. The position for the last of this week (April 24) is: right ascension, $1^h\ 40^m$; north declination, 39° 39′, with a calculated brightness of 62: it is nearly midway between the second magnitude stars β and γ Andromedae, and sets a little after eight o'clock. The astronomical positions we have given can readily be found upon the star-maps (map I.) given in the *Science* Almanac for last year (vol. iv. No. 99) or upon any celestial atlas.

The new nebula in the Pleiades. — The nebula discovered by the Henry brothers of the Paris observatory, upon their photographic negative of the Pleiades taken Nov. 16, 1885, has been seen — now that its existence is known — without great difficulty, by Perrotin and his assistants at Nice, and by Struve with his new 30-inch Clark objective, and also with the 15-inch at Pulkowa. Struve gives a careful description of the nebula, accompanied by a sketch, in the *Astronomische nachrichten* (No. 2,719), and from his observations it seems probable that some of the small stars in the immediate neighborhood may prove to be interesting variables. The nebula is of a characteristic spiral form, and seems to 'escape' from the star Maia. Professor Pickering, upon the announcement of the discovery, recalled the circumstance that certain irregularities had been noticed in a photograph of the Pleiades taken on Nov. 3, 1885, at Harvard college observatory. These irregularities, which had been referred to defects in the photographic process, correspond closely with the descriptions of the nebula, and no doubt represent light photographically visible near Maia. "The explanation thus afforded, of one of the markings on the Cambridge photograph, makes the others of more interest than seemed at first to belong to them. There are indications of nebulous light about Merope; four short parallel streaks directed to the south following side are particularly noticeable, and a faint prolongation of diffuse light may be suspected towards the south, in agreement with the descriptions usually given of the visible nebula in that region. There is also a faint streak of light projecting from Electra on the following side. . . . No nebulous light is noticeable about Alcyone, Atlas, Pleione, or Taygeta."

NOTES AND NEWS.

As stated in our 'Boston letter' of March 12, the liberality and co-operation of the Woman's education association enable the Boston society of natural history to announce that the Seaside laboratory at Annisquam, Mass., will be open to students during the coming summer from June 15 to Aug. 15, 1886. Annisquam is situated on an inlet of Ipswich Bay, on the north side of Cape Ann,

and is about three miles and a half by coach from the Eastern railroad station in Gloucester. The purpose of the laboratory is to afford opportunities for the study of the development, anatomy, and habits of common types of marine animals, under suitable direction and advice. There will be no attempt to give lectures or any stated courses of instruction. The laboratory has been in operation for four successive summers, and has fairly met the wants of a number of students, teachers, and investigators. Those who have had some experience in a laboratory, who have attended practical lessons, or who have taught in the schools, are sufficiently qualified to make use of this opportunity. The instruction and work of the laboratory will be under the immediate care of Mr. B. H. Van Vleck, assistant in the laboratory of the Boston society of natural history, a gentleman well known as a teacher, and who has also had long experience in collecting and observing at the seaside. Applications should be made immediately, and can be addressed to Mr. B. H. Van Vleck.

— The Boston *Transcript* states that Mr. Alfred Russell Wallace, the celebrated English naturalist, who shares with Darwin the honor of an independent discovery of the law of 'the survival of the fittest,' is coming to the United States on the invitation of Mr. Augustus Lowell of Boston, to deliver a course of eight lectures before the Lowell institute, in that city, beginning in October. It will be remembered that it was on a similar invitation (from Mr. Lowell's father) that Professor Agassiz first came to America, in the autumn of 1846. After completing his Lowell institute course, Mr. Wallace will lecture in other cities, and proposes to return to England in the spring of 1887. His subjects will be chosen from natural history.

— During the past week the occurrence of a large number of insects of a formidable appearance in Washington has attracted considerable attention. The following account of their habits and appearance is given by one of the entomologists of the agricultural department: This large insect of two inches and a half, or more, in length is the Belostoma americanum of entomologists, and belongs to the order Hemiptera, or true bugs. It lives in ponds and sluggish streams during the immature state, in which it has no wings, and is full grown in fall, remaining in the ponds during the winter. When, in the spring, the warm weather awakens them, they come forth at dark, often in immense numbers, and fly about: the sexes mate, and they return to the ponds in which the female deposits her eggs. They are strongly attracted by light, and especially by electric lamps, under which vast numbers often strew the walks, and are crushed under foot. Their sudden appearance often creates alarm; and during the past week or two, specimens have been received from various parts of North Carolina and other southern states, the writers often in evident fear of damage from this insect invasion. But they are perfectly harmless. They are, it is true, able to inflict a very painful bite, for they are provided with a short, sharp beak; but they never do so voluntarily, and they do not live on any thing in the way of vegetable matter outside of the water. They are carnivorous, feeding principally on less powerful water-insects, and not despising an occasional fish, frog, or other bit of flesh that may come in their way. They have been just as abundant in previous seasons, but have not been so much noticed, for the reason that there have not been so many electric lights to which they could be attracted. Like so many of the true bugs, they have a very peculiar and rank smell. A number of other water-insects are also attracted to light, but never in such quantities.

— The following papers were entered to be read at the annual meeting of the National academy of sciences, which convened at Washington, Tuesday, April 20: G. F. Gilbert, The geologic age of the Equus fauna; T. Sterry Hunt, The Cowles electrical furnace; E. D. Cope, On the phylogeny of the Batrachia; On the phylogeny of the placental mammalia; H. A. Newton, The comet of Biela; Elias Loomis, Areas of high barometric pressure over Europe and Asia; Samuel H. Scudder, The cockroach in the past and present; James D. Dana, Biographical memoir of Arnold Guyot.

— In his annual report for 1885, the United States entomologist continues his report on silk-culture in the United States. He does not speak very encouragingly of its immediate success as a profitable industry, and thinks any stimulus given to it must needs be temporary, and that the substantial way of encouraging the industry will be by imposing an import duty on the reeled silk from foreign countries. Two stations have been established by the agricultural department during the past year for the production of reeled silk; and Dr. Riley concludes, that, with the introduction of the improved Serrell reel, the cost of reeled silk per pound may be reduced to $4.38. The cost of several hundred pounds of reeled silk produced at the New Orleans station was $5.90 per pound, or, as corrected for needless expenditure, $5.35: it brought in the market $4.50.

— The meeting of the engineers' club of Philadelphia on April 3 was spent in an interchange of views as to how to best promote a more extended discussion of the numerous subjects brought before the club. Various methods of bringing original papers to the early attention of members likely to discuss them were proposed, and the subject was finally referred to a committee. This is a serious question with most of the scientific clubs of the country, which find their meetings generally of a stiff and formal character, tending to stifle all debate.

— The chemical laboratory of Fresenius at Wiesbaden enjoys a very large attendance, says the *Chemical news*. In the winter term, 1885–86, there were 90 students on the books. Of these, 58 were from Germany, 6 from Austro-Hungary, 6 from North America, 5 from England, 5 from Russia, 3 from France, 2 from Switzerland, 2 from Holland, 1 from Luxemburg, 1 from Sweden, and 1 from Norway. Besides the director, Geh. Hofrath Prof. Dr. R. Fresenius, there are engaged as teachers in the establishment Prof. Dr. H. Fresenius, Dr. E. Borgmann, Dr. W. Fresenius, Dr. E. Hintz, Dr. med. F. Hueppe, and Architect Brahm. The assistants in the instruction laboratory were two in number, in the private laboratory twelve, and in the versuchsstation three. During the last term, besides the scientific researches, a great number of analyses were undertaken in the different departments of the laboratory and the versuchsstation on behalf of manufacture, trade, mining, agriculture, and hygiene.

— The Woman's education association of Boston has made arrangements for a course of lessons in botany by Prof. George L. Goodale of Harvard university. The course is designed to present the principal laws of life and growth of plants, and will deal especially with methods for cultivating and collecting plants for study. Each lecture will occupy about half an hour, and, as in former years, will be followed by a practical exercise in the examination of plants. These laboratory exercises are arranged for beginners, but will also serve to supplement previous courses of botanical practice. The lectures will begin on Monday, March 22, and will be given on Fridays and Mondays in the rooms of the Natural history society. Tickets for the course, at ten dollars, may be obtained at the Natural history rooms.

— It is proposed to raise a fund by public subscription for the purpose of presenting a testimonial to the Rev. H. H. Higgins of England, in recognition of the services he has rendered to the cause of education, and especially to the various departments of science during the last forty-three years. Contributions may be sent to Baron L. Bevas, 1 Lord Str., Liverpool, Eng.

— The office of *secrétaire perpétuel* of the French academy, left vacant by the death of M. Jamin, has been filled by the election of M. Vulpian. The two principal candidates were M. Vulpian and M. Alphonse Milne Edwards, the former of whom received twenty-six, the latter twenty-four votes.

— It has long been known that petroleum existed in the vicinity of Jemsah, on the west coast of the Red Sea, about one hundred and seventy miles south of Suez; but previous explorations have produced no result. In September, 1884, a Belgian mining engineer, M. Debay, was sent to report on the possibilities of the practical working of the oil-beds, and, after much trouble, he has finally succeeded in reaching practical results. After penetrating successively through gypsum, containing veins and nests of sulphur, shale, green and blue clay, limestone, and sandstone, the drill, on Feb. 28, fell suddenly forty centimetres, and petroleum rose to a point two metres above the sea-level. On receipt of the news, Nubar Pasha arranged an expedition of experts, from whose examination there has resulted the establishment of the following facts: that petroleum undoubtedly exists; that the geological formation of the country is favorable to the existence of larger quantities at lower depths; that the store of oil is generally distributed over a large area in the neighborhood; that under existing unfavorable conditions a single source yields about two tons daily; that the specific gravity is .88; and that the spot is easily accessible from the coast, where there is good anchorage.

— The ravages of the phylloxera have, during the past year, extended into a number of cantons in Switzerland where the insect has never been hitherto observed, and have caused considerable uneasiness in the wine-producing industry. In connection with the continual extension of the fields of its devastation in foreign countries, it is of interest to note, that, in Professor Hilgard's last report of the viticultural work in California, it is stated that the habits of the insect in that state deviate from those observed in foreign countries to such an extent that the dangers of infection are much lessened. These differences in habits consist in the rarity of the winged female form, and the apparent absence of winter eggs, both probably due to the climatic influences. The mercurial vapor remedy, of which much has been hoped, has, in the hands of Professor Hilgard and his assistant Mr. F. W. Morse, failed to produce its promised results as a phylloxera insecticide.

—A new explosive has been invented by F. Redtenbacher, a mining engineer in Austria. It probably contains only the elements of ordinary powder, but in proportions determined by twenty odd years of research. This powder is brownish black in color. The advantages of the explosive, which is known as 'miline,' are its insensibility to percussion or friction, and that it can only be ignited by a spark. There exists, therefore, little danger in its transportation and preparation. It does not undergo any modification under the influence of temperature, and only ignites at 335° to 340° C. It burns with little smoke, and does not produce any deleterious gas. It can be employed exactly as powder, and, when well tamped, its effects are comparable with those of dynamite.

—Mr. A. Vogel has recently shown (*Centralblatt f. agric. chemie*) that cinchona-trees, growing in hot-houses in Europe, develop no quinine in their bark.

—King Oscar of Sweden has ordained two prize contests on oriental subjects, — one, the history of the Semitic languages; the other, a description of the Arabic civilization before the time of Mohammed. The prizes are a gold medal worth 1,000 Swedish crowns, and a sum of money equal to 1,250 Swedish crowns. The treatises may be written in Latin or German, and may be forwarded to Professor Fleischer of Leipzig, or Professor Nöldecke of Strassburg, before June 30, 1888.

—The investigation before the Massachusetts legislative committee on the subject of arsenic in wall-paper indicates that the danger has been exaggerated. Prof. C. F. Chandler testified, that, from careful experiments, under no conditions could arsenical poisoning occur through breathing arsenurated hydrogen from wall-paper, and that the only source of danger would be from friction alone.

—Prof. L. Geiger of Berlin is about to issue a *Zeitschrift für die geschichte der Juden in Deutschland*. It will be scientific in character and treatment, and, in addition to essays and reports of research, it will contain summaries of historical materials that are difficult of access or hitherto unprinted. It will also make its bibliographical notes an especial feature.

—The Smithsonian report for 1884, just issued, contains, like the previous ones, the secretary's annual report, and summaries of scientific progress in the natural sciences, by E. S. Holden, C. G. Rockwood, F. M. Green, C. Abbe, G. F. Barker, H. C. Bolton, E. S. Dana, J. B. Marcou, T. Gill, and O. T. Mason, together with a number of miscellaneous papers on anthropology.

LETTERS TO THE EDITOR.

. *Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

New York agricultural experiment-station.

In your review of the fourth annual report of the New York agricultural experiment-station (*Science*, vii. No. 165) you deal very leniently with some of the most glaring faults of that report. This is certainly the pleasanter way; but does it best subserve the cause of truth and progress? That station is unquestionably doing valuable work for the cause of progressive agriculture, and, because of the ability thus manifested, the anxiety of the friends of that cause is the greater that its splendid opportunities should not be frittered away in a kind of work which, if persisted in, will inevitably bring about its ruin.

The fundamental mistake in the management of this station, as manifested by this report, is the endeavor to cover too much ground. The field of agricultural experimentation is so vast, that he who would accomplish any worthy result must confine his labors to a limited portion of it; but in this case so many problems have been attacked, that few receive that close and careful attention which is the first requisite of truly scientific work. The director makes frequent reference to the necessary incompleteness and unreliability of isolated tests, and does good work in showing the variability of duplicates; but the infrequency with which he collates the results of his present experiments with those previously made by himself or other equally competent authorities, and the frequency with which he disregards his own testimony respecting the necessity for the duplication of tests, intensify the feeling that the value of a large proportion of the work of this station is seriously impaired by its desultory character.

The impression, that, in much of this work, quantity is attained at the expense of accuracy, is strengthened by page after page of the report. Typographical errors are difficult to wholly avoid; but it is putting the case very mildly to say that they occur with unnecessary frequency here. This point, however, might be passed without notice were these the only evidences of hasty or careless work. In the tabulated report of the experiment in feeding starch-waste, for instance, we are left to conjecture which columns of figures relate to hay, and which to starch-meal, while no practical feeder would have been guilty of the absurdity of feeding a rich meal *ad libitum*, and following it by hay fed in the same manner, where it was desired to make a scientific test of the feeding-value of either food. Under the circumstances, the allusion to the capriciousness of appetite in the cows under test is amusing.

The fertilizer test recorded on p. 40 affords another striking example, both of the crudity of the methods employed at this station, and of the carelessness in reporting results. What would the magnificent Rothamsted experiments have amounted to, had the plots in Broadbalk field received enormous dressings of fertilizers one year, none the next, and varying quantities in the succeeding years, or if their interpreter had shown such carelessness in the summarizing of results as has been shown in giving the total quantities of fertilizers used in this case?

In conclusion, I must wholly dissent from the idea conveyed in the closing paragraph of your review,

that an experiment may have a so-called practical value and yet be worthless to the man of science. What is science but accumulated and co-ordinated facts? What fact is there which confirms, disproves, or illustrates any supposed law of vegetable or animal growth, that is not valuable to the scientific man, and to the farmer as well? What agricultural experiment, worthy the name, but must perform this function? It is true, the farmer may be more interested in the results of the experiment, as in a comparative test of different varieties of wheat, while the scientist may be more desirous of ascertaining what constitutional peculiarity enables the one variety to surpass the other in yield; but in either case the fact that the one variety is the more productive is the stimulus of the investigation, and the methods of culture must be the same if trustworthy data are to be obtained for the use of either scientist or farmer. I do not forget that valuable facts have been learned from experiments which would be utterly impracticable in the field, and I would be the last to deny the usefulness of such work; but, until the applicability of these facts to the methods of the farmer has been demonstrated by field experiment, they are practically valueless. I do not deny that the study of isolated individuals, or of small groups of individuals, has a legitimate place in the work of the experiment-station; but, until the results of that study are shown to be applicable to the field or to the herd, they are worthless to the farmer, and equally worthless to the scientist. But this demonstration must be made by men trained to the scientific method.

C. E. Thorne.

Settlement of labor differences.

Last week's *Science* contains some views of Mr. N. M. Butler on the 'Settlement of labor differences,' which claim to be from the stand-point of 'science and philosophy,' which is explained to mean freedom from false notions and prejudices, and to be the observation of facts and relations as they are.

He says that 'we' are apt to look upon the present economic system as fixed and final. Who are 'we'? 'The fact as it is,' is that in America, England, France, Germany, etc., men by the thousands and hundreds of thousands most decidedly do not feel that way at all. Numerous American citizens known as Knights of labor have combined and organized for the express purpose of changing the present wage (i.e., private capital) system into an integral co-operative one; and, what is more, they work with earnestness, determination, and devotion to realize that end. Instead of "feeling an irresistible desire to look upon the (social evolution) process as completed, and the book of evolution as closed," they feel an irresistible conviction that society is entering on the threshold of a new form of economic organization. This belief is scientific; that is, it is based on experience carefully made and closely analyzed, as may be seen in the works of Karl Max, F. Engels, Henry George, and very clearly in that American writer George Gronlund's book, 'The co-operative commonwealth.'

Mr. Butler says something about "the ethical fact that there is a superiority of possessions." What can it mean?

Mr. Butler adds his voice to the chorus of 'arbitration' fetich-worshippers. Arbitration is to have 'magic' results. So it must, if it will harmonize the interests that are diametrically opposed, as are those of capitalists and laborers in regard to sharing the product of labor.

But, say the 'arbitration' and 'harmony' preachers and Mr. Butler, the product is the combined result of the efforts of the capitalist and laborer. Sometimes the capitalist adds his efforts to the work of producing by direct labor, or indirectly by doing the requisite directing of the work, and sometimes he does not. When he does apply personal effort, he is entitled to reward; but that is a different thing from the profit on his capital which will go to him if he hires managers or agents, or is merely an investor or shareholder in a business he neither does nor can manage, nor in any way add 'effort' of his own to the work of production.

No, the capitalist need not work. He can (and many do) live in idleness, consuming enormously without producing at all, and, on an average, he never gives an equivalent of effort for what he gets: hence there is want of equity in the capitalistic system.

It is self-evident that no arbitration, but only a radical change of the system, can abolish this injustice; and this injustice is the cause of the 'labor differences.'

'Christian charity' will not suffice here; that is, the 'give all you have to the poor' doctrine will not do, but, rather, a modernized adaptation of the institutions of the primitive Christians, who had some primitive form of integral co-operation, for they held 'all things in common' (see the story of Ananias).

As to arbitration as a sort of palliative patchwork for making temporary compromises, perhaps it is good for that; but 'brute force,' in the form of police and militia, has to stand behind it to make capitalists keep their agreement, which they have broken in innumerable instances when it was in their interest and power.

Whether the change from the capitalistic to the co-operative mode of production will be by 'brute force' depends on the resistance the capitalists make to the course of evolution. History shows that privileged classes generally have appealed to brute force whenever their privileges were in danger.

The advice of science they do not heed. It is interest that guides them. Science, that is, our judgment of future facts by past ones, says the course of evolution of human society tends to abrogate all privileges and equalization of rights and duties. This is the democratic principle. When applied to social economy, it is termed 'socialism' or 'social democracy.' The capitalist cannot be a mere trustee without first ceasing to be a capitalist. This implies an entire change of the laws of property: hence the advice of science to labor is, Organize to make the requisite change of laws; that is, go into politics as a party to establish an economic republic, *electing* your directors of labors. That will settle all differences between capital and labor, because there will be no capitalist, and all will be laborers or starve.

Chas. Field.

Eskimo building-snow.

In your issue of Jan. 15, 1886, you give an illustration of what purports to be 'hardened snow' impacted on a Mount Washington telegraph-pole by a strong gale. During the past winter I have

noticed the same formation at this station upon the anemoscope and anemometer. I would like to inquire whether the Mount Washington formation is really snow driven against the pole by the gale, or, as at this station, an accumulation of fog in a frozen state. This formation I have never observed during snow-storms, even when accompanied by winds of sixty miles and upwards, but it is of frequent occurrence when a heavy cloud envelops the peak.

T. W. SHERWOOD,
Sig. corps, U.S.A.

Pikes Peak, Col., April 15.

Quaternary volcanic deposits in Nebraska.

It was the good fortune of the writer to discover the following significant section during the last holiday vacation. It is in one of the abrupt bluffs overlooking a sharp bend of the West Blue River, in the southern part of Seward county, Neb. It exhibits the formations from nearly the general level down to the level of the stream. It is as follows: 2 ± feet soil; passing into 6 ± feet red gritty loam; 9 ± feet stratified loamy clay, with thin streaks of small white quartz pebbles; passing into 3 ± feet mostly gravel, with a few bowlders of red quartzite from Dakota; passing into 15 ± feet stratified loamy clay with streaks of pebbles; 6 to 10 inches of light gray earth, volcanic ashes, thinly and evenly laminated; 1½ feet clay, darker above; below passing into 5 feet fine gray sand, with thin clay laminae 6 to 12 inches apart; 1 ± foot coarse sand with pebbles and bowlders of red quartzite, — greenstone, — granite, etc., with an uneven surface below; 6 feet hard greenish joint clay; 8 feet slope; water of the West Blue River.

A few rods distant a less complete but similar section shows the siliceous layer five feet thick, and it appears along the sides of a ravine at different places for several rods, showing considerable persistency. Specimens of it have been submitted to Mr. J. S. Diller of the U. S. geological survey, with another sample from Knox county. He replies, "Specimens No. 1 (Knox county) and No. 2 (Seward county) are volcanic dust. They are composed chiefly of minute angular fragments of pumiceous glass, such as is thrown high into the air during violent eruptions, and wafted by currents of air for hundreds of miles away from its source. The fragments of glass are, for the most part, clear and transparent, with few traces of crystalline matter. Besides the volcanic glass, there are numerous grains of quartz sand, which are well rounded. . . . As nearly as I can estimate, from the small quantity examined, more than ninety per cent of the whole is volcanic dust. It appears that the material is of complex origin. While there is no doubt that the volcanic dust was borne by winds nearly or quite to its destination, the rounded grains appear to be of aqueous origin, and suggest that the dust may have fallen in a body of water, where the two commingled."

Several important conclusions seem well-nigh demonstrated by this section.

1. The occurrence of important volcanic action somewhere in this region during the quaternary. The red quartzite could not have arrived in this locality before the glacial epoch. If the section eventually proves to be of a local formation, which does not seem likely, it would only make the deposition of the dust more recent.

2. The character of the siliceous deposit strongly supports the conclusion that it was dropped in a deep or quiet lake. This accords well with the deposits above and below; for the bowldery layers are, for evident reasons, referred to floating ice, and the character of stratification favors lacustrine rather than fluviatile conditions: hence we are led to believe that this lake was contemporaneous with the ice-sheet which occupied the regions of Dakota and Iowa. We catch a glimpse of the joint action of frost and fire on our western plains.

3. From the location of the section, and its relation to the White River tertiary sands, which, if rightly identified, are widely exposed east of this point, it appears not unlikely that this lake was but the diminished stage of King's Lake Cheyenne. Numerous finds of these siliceous beds have been reported from the republican valley, and one as far east as Oak Creek, Lancaster county. They probably belong to this same geological horizon.

J. E. TODD.

Tabor, Io., March 20.

World time.

The last number of *Nature* contains a lecture by Mr. Christie, the astronomer royal of England, on universal or world time. With Mr. Christie's principal conclusion I fully agree, but have not much faith in some of his arguments, or in some of the results he predicts.

Mr. Christie bases one of his arguments on the ignorance of farmers, and infers, that, because the farmer cannot tell a difference of half an hour in his time, we may therefore make this difference four, five, or ten hours. But would the farmer be any better off if he should tell his wife that he wants breakfast at sixteen, seventeen, or twenty-two o'clock? Of course not. And it is not wise, I think, to base any permanent action on the ignorance of any class of men. Conditions may change; and such arguments, though they may answer for a political or military campaign, are easily overdone, and must be looked upon as only temporary.

The most vicious assumption that underlies Mr. Christie's argument, and which he has in common with some other astronomers, is this: he assumes that man was made for railroads and telegraphs, and not that these things are for man. My natural assumption would be that the chief astronomer of a great country would have a wider view of things. But we all know the liberality and influence of our great corporations, and how they deal out free wires and free service; and we have all felt this on the reception of a free telegraphic despatch when we come to the last letters, *D. H.*

Now, I say with Mr. Christie, let the railroads adopt a world time, and it does not matter what meridian they take, though Greenwich is probably the best, and let all their trains be run on this time. Then, directly opposite to Mr. Christie's proposition, let all the cities, villages, and farmers return to their local and natural time. If the railroads will do this, the most ignorant farmer will soon understand matters. I speak with confidence, because forty years ago I was a farmer myself, and very ignorant. There has been too much confusion given to this matter, and our astronomers have been too eager to sell time. They have better work to do.

ASAPH HALL.

Certain questions relating to national endowment of research in this country, and their importance.

In reply to your able critic (W. S. N., in *Science*, vii. No. 165) of my letter bearing the above title (No. 164), permit me to refer him to my articles upon science and the state, recently published in *Mind in nature*, of Chicago, and, if his interest carry him that far, to do me the simple justice of re-reading my letter in *Science* which prompted his questions, — questions which I will here endeavor to answer for him.

In the first place, let me most emphatically reiterate my opinion, that I am fully in favor of the government endowing researchers in civil life, as well as affording the proper opportunities for the successful prosecution of the labors of those scientists upon her own rolls. May I ask my critic to again peruse that paragraph in my letter that is completed with the following words, "I stand on the side of the King of Denmark, in his principle as applied to Tycho Brahe," and then ask himself if my being interrogated as to my convictions upon the question as to whether or no it devolves upon the government to aid researchers in civil life was necessary; and I think he will find, upon reconsideration, that there is no difference of opinion between us upon that point.

As to the proper ones who should receive such aid from the government, either in civil life or the services, let my critic place the correct construction on the word 'demonstrated,' when I say in the sentence he quotes from my letter, "of those persons in her employ who have from time to time demonstrated their fitness to perform certain work," and I must believe we will agree here also. Mind you, I am not in favor of promptly affording assistance to any one and every one, or to him who suddenly springs up, and exclaims, "Lo! I am a scientist, I can write a book, I believe I am an investigator and a genius." My advice to such a person would be, 'Demonstrate it, my good friend.' As to the amount of assistance the government should render to those exceptional persons in this country who have demonstrated their peculiar fitness to prosecute certain lines of research with marked success, I concur fully in the opinion of Professor Huxley, who says, "Now, the most important object of all educational schemes is to catch these exceptional people, and turn them to account for the good of society. No man can say where they will crop up; like their opposites, the fools and knaves, they appear sometimes in the palace, and sometimes in the hovel. But the great thing to be arrived at, I was going to say the most important end of all social arrangements, is to keep these glorious sports of nature from being either corrupted by luxury or starved by poverty, and to put them into the position in which they can do the work for which they are specially fitted." I quoted these excellent words nearly three years ago in the New York *Medical record*, and again in my article upon science and the state in *Mind in nature:* so there is some danger of their becoming immortalized, though I considered them immortal when they were first penned. I will say, however, that, if occasion requires, I will quote them again, — quote and quote, till they become even the battle-cry of the socialists themselves.

Regarding the progress of our nation, from an evolutionist's point of view, as I do, I must consider, from the very limpets in our fauna, through every atom we lay claim to, our bodies and brains, our minds and our works, our institutions and industries, our opinions and our language, nay, through our very government itself, — I must consider, I say, the whole as one glorious growth and development. During this growth, that limb of the common tree which bore the crop of American scientists undoubtedly did encroach upon the government service; and to the extent of this encroachment only do I "claim a monopoly of talent in government employ."

It was from this broad basis that I attempted to write my letter upon national endowment, and I feel pained that I should have failed in anybody's eyes. My suggestions for a scientific corps for the army and navy, my papers upon science and the state, were prompted solely through the same sentiment.

Is it too much to hope that some such re-organization as the department of science that I have elsewhere suggested, may some day be an idea realized, or do I peer too far into the future, when I see other zoölogical stations scattered along both of our extensive coasts, repeating, and repeating again, the magnificent national work that has been accomplished by the staff at Wood's Holl? Or, scanning the horizon still farther, is it too much to hope that somewhere in the dim future that change may come o'er the dream of the official mind, and it, too, see the grand natural law that the nineteenth century has wrested from nature's secrets, and that the principles of evolution which are becoming more clearly defined for us every day be turned to practical use, and a little bending of the twigs be done by the government, to the extent of utilizing these evolved products for the nation's good? Then those who have demonstrated their peculiar fitness will be taken up by the government as one of her most powerful weapons; and room will be found for their strength, in this very department of science, these zoölogical stations on our coast, and similar zoölogical and meteorological stations established, as they should be, at suitable points all over our broad empire.

R. W. Shufeldt.

Fort Wingate, N. Mex., April 8.

The American ornithologists' union code and check-list of North American birds.

By an unfortunate oversight, the committee of the American ornithologists' union on classification and nomenclature of North American birds omitted to recognize in the preface of the 'Code and check-list' the important aid rendered the committee by the gentlemen invited to share in its labors. Dr. L. Stejneger, Dr. C. H. Merriam, and Dr. T. N. Gill were present at numerous meetings, participated in the discussions, and are entitled to grateful recognition by the committee for their services.

Dr. Stejneger not only gave valuable assistance to the subcommittee on species and subspecies, particularly in relation to questions of synonymy, but was also present by invitation at most of the meetings of the whole committee, took an active part in its discussions, and contributed valuable assistance in the formulations of the 'Code,' — assistance which the committee is glad to gratefully acknowledge.

Committee of the American ornithologists' union on classification and nomenclature.